



Natural Formation Evaluation Azimuthal Gamma Ray

Azimuthal Gamma Ray

Company: Cub Creek Energy

Well: Markham 9

Weld County

County: Weld County State: Colorado

Surface Location:

Latitude: 040° 16 8.292' N

SEC: 32 TWN: 4N

Elevation: 5040.00 ft

Above P.D.	17.00 ft
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KB:	N/A
DF:	5057.00 ft
GL:	5040.00 ft

Magnetic Field Reference

Azi Reference North:	True	Dip Angle: (deg)	66.75
Total Magnetic Field Strength: (nT)			52394
Mag to Reference North Correction: (deg)			8.57 E

Casing Rec

Size (in)	Weight (lb/ft)	From (ft)	To (ft)
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9.625	36.00	17.00	1528.00
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Deviation Record

Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)
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13.500	1441.00	1.35 348.79	1.62 184.88
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8.500	10445.00	1.62	184.88	91.08	273.62
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[illegible]

[illegible]

Other

G3.3

3.3.7410.1

MD

D&E

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Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours (h)
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
2	2	8.500	PDC	3.00	AutoTrak Curve	1526.28	6675.37	1538.62	6682.09	2016-09-21 22:40	2016-09-23 04:39	18.57
3	2	8.500	PDC	3.00	AutoTrak Curve	6669.20	11976.70	6682.09	11983.42	2016-09-23 15:28	2016-09-25 01:10	34.91

Crew

Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite
Austin Small		2016-09-20	2016-09-25	Matthew Delmore		2016-09-20	2016-09-23	Tien Bui		2016-09-23	2016-09-25

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2016-09-21 07:18	2	1538.62	Water Based Mud	8.5	28	9.6	32.0	N/A	Suction	1800	0.00
2016-09-22 07:14	2	2866.04	Water Based Mud	8.5	26	9.5	57.0	N/A	Suction	1500	0.00
2016-09-23 12:28	3	6682.09	Water Based Mud	10.0	N/A	N/A	N/A	N/A	Suction	2100	0.00
2016-09-25 06:24	3	11983.42	Water Based Mud	10.0	N/A	N/A	N/A	N/A	Suction	1900	0.00

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
2	ATC_SU	12653420	Near Bit Inclination	5.93	6.72	7.000	4.330
2	ATC_SU	12653420	Near Bit VSS	5.93	6.72	7.000	4.330
2	ATC_MWD	12656433	Gamma (single)	2.19	12.34	7.000	3.250
2	ATC_MWD	12656433	Directional (mag)	12.26	22.41	7.000	3.250
3	ATC_SU	13809445	Near Bit VSS	5.93	6.72	7.000	4.330
3	ATC_SU	13809445	Near Bit Inclination	5.93	6.72	7.000	4.330
3	ATC_MWD	12284467	Gamma (single)	2.78	12.89	7.000	3.250
3	ATC_MWD	12284467	Directional (mag)	12.30	22.41	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

Comments


- 1 Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
- 2 Baker Hughes LWD Run 1 utilized 8 1/4 inch NaviTrak service (Directional only) behind a 13 1/2" inch bit and steerable assembly from surface to 1538 feet MD (surface to 15389 feet TVD).
- 3 Baker Hughes LWD Runs 2 and 3 utilized 6 3/4 inch AziGamma services (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 1539 to 11983 feet MD (1539 to 7068 feet TVD).

Remarks

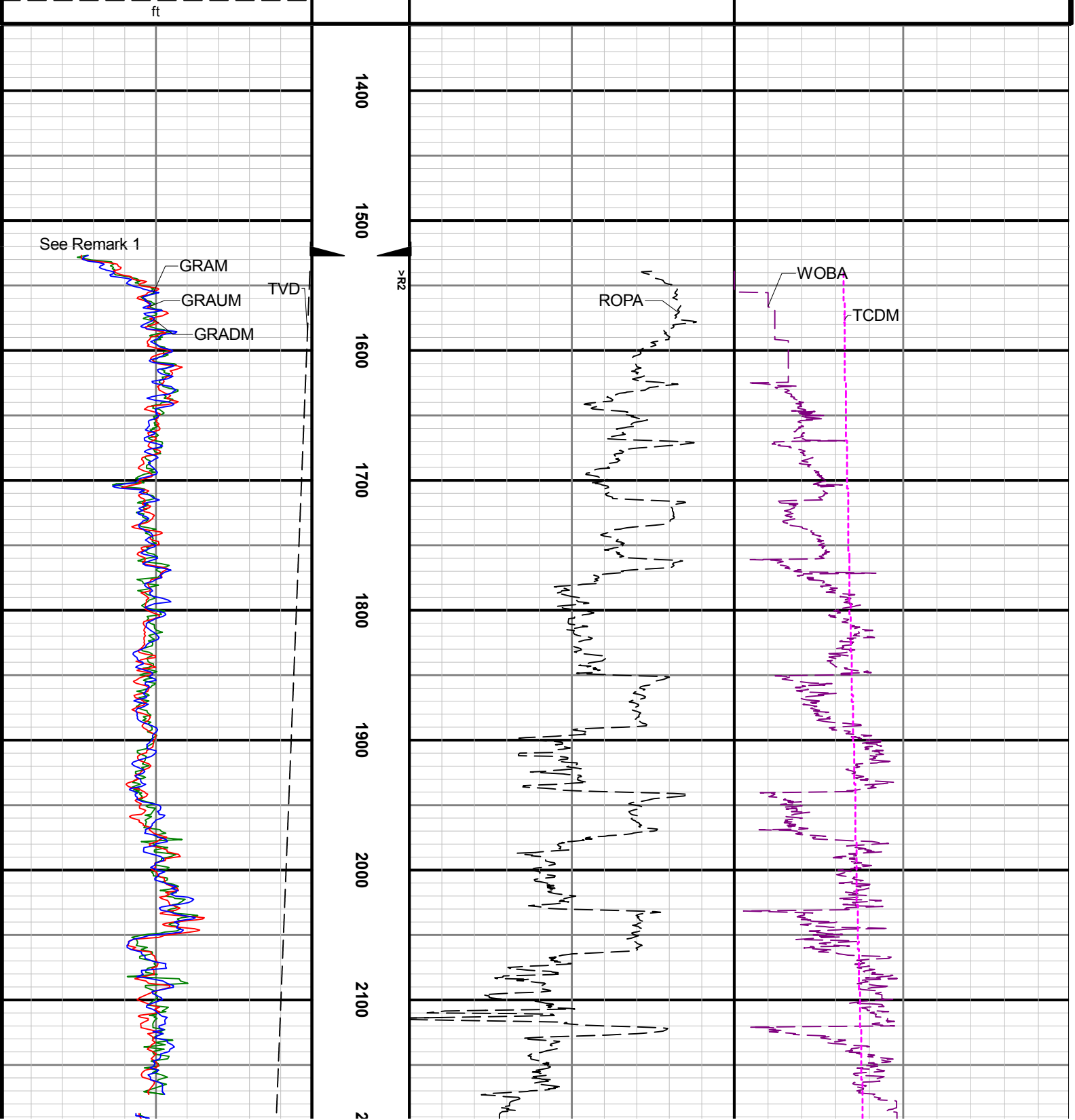
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1539.00	8.500	2	Gamma Ray logging operations began at 1539 feet (1539 feet TVD).
2	6675.00	8.500	3	The interval from 6675 to 6682 feet MD (6417 to 6423 feet TVD) was logged up to 12 hours after being drilled due to a trip out of the hole to inspect Bit.
3	11976.00	8.500	3	The interval from 11976 to 11983 feet MD (7068 feet TVD) was not logged due to sensor offset at well TD.

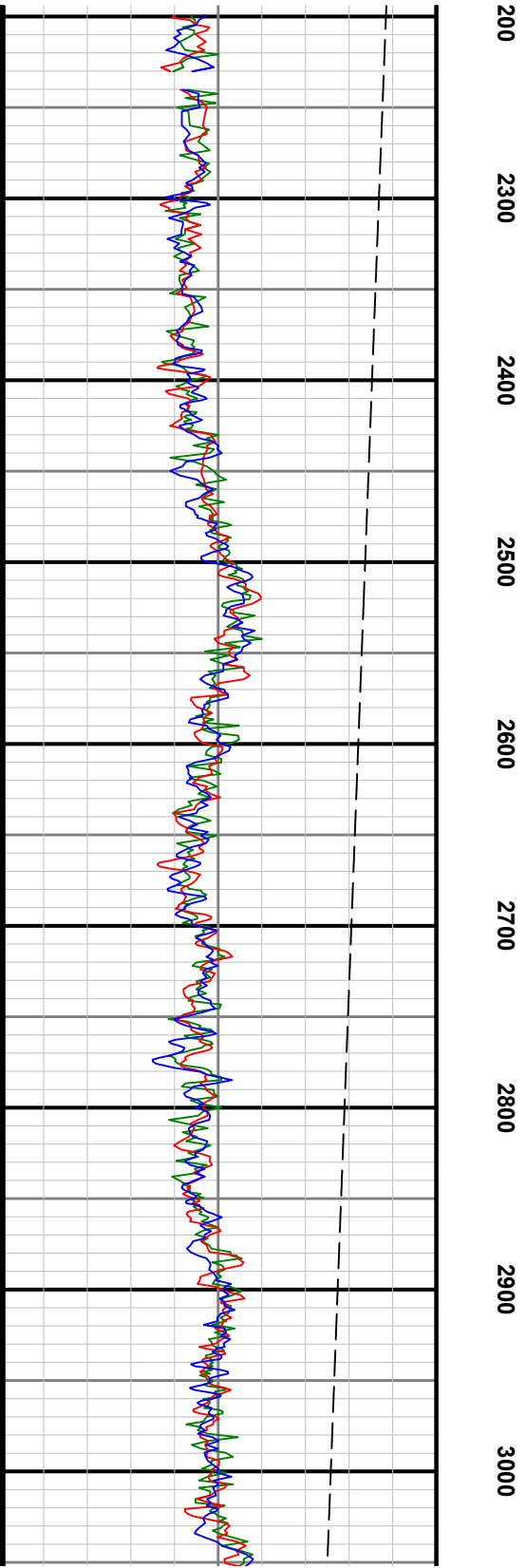
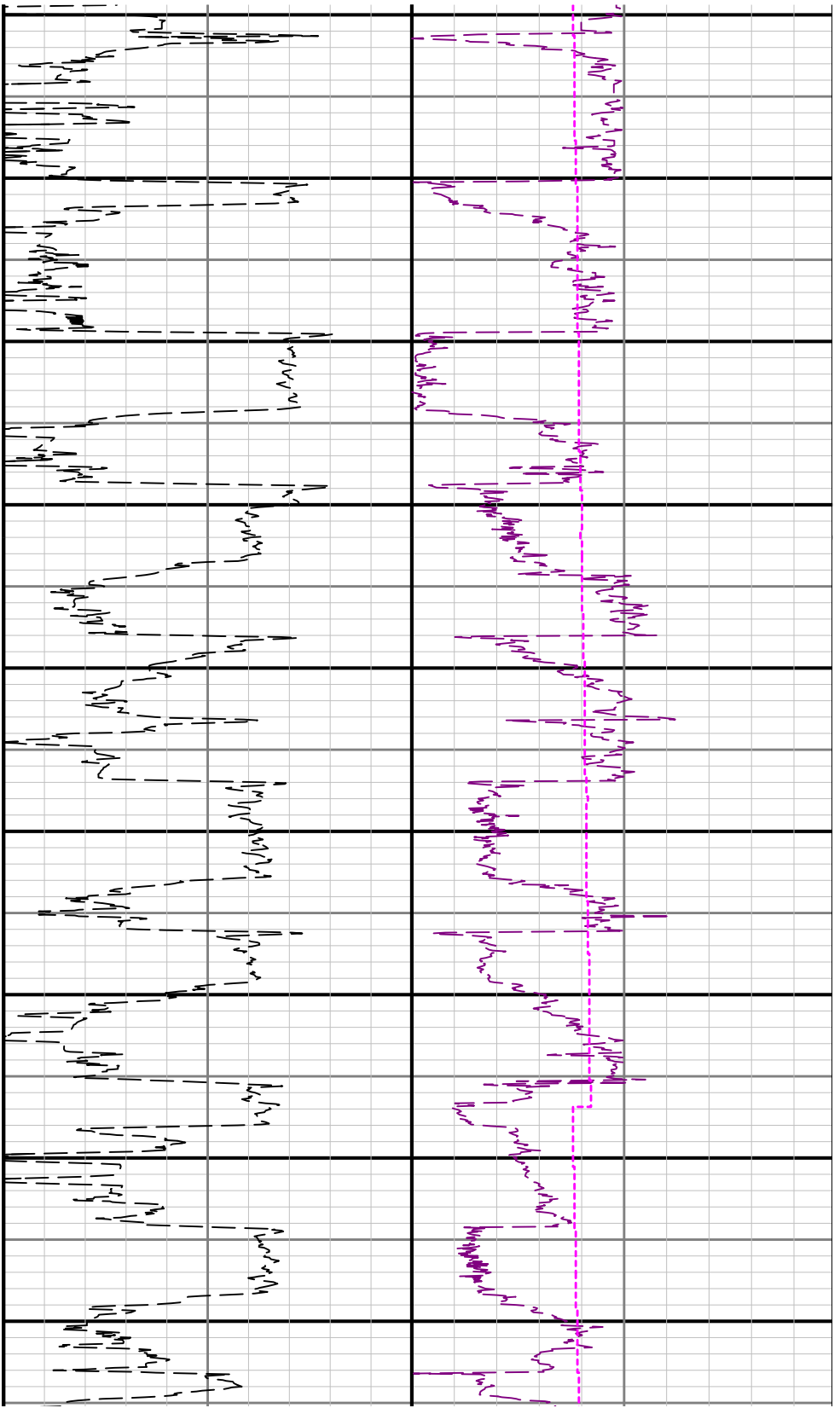
Curve Mnemonics

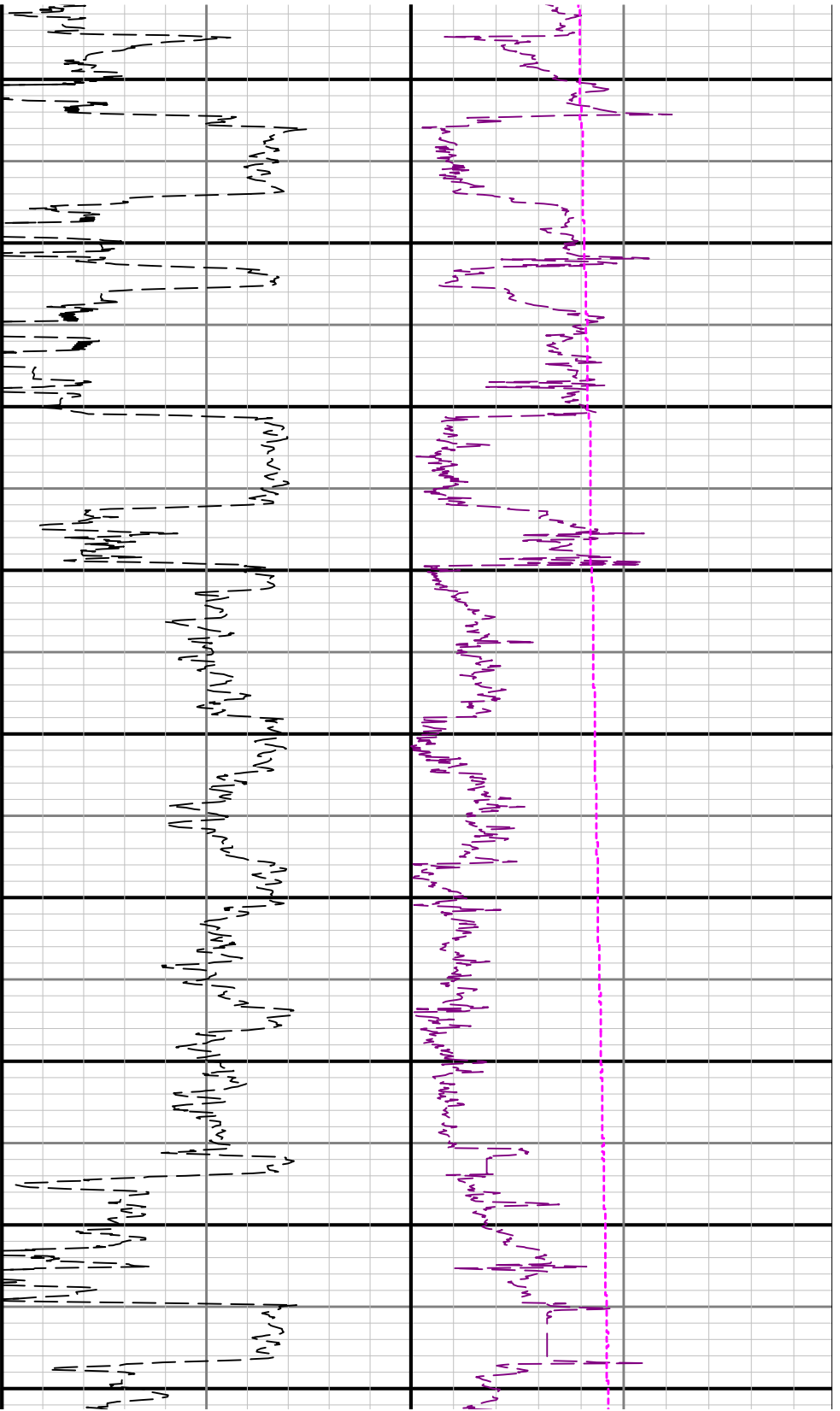
Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
GRADM	Azimuthal Gamma Ray - Apparent - Down Quadrant 3 ft Average	API
GRAM	Gamma Ray - Apparent 3 ft Average	API
GRAUM	Azimuthal Gamma Ray - Apparent - Up Quadrant 3 ft Average	API
TCDM	Downhole Temperature	degF
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb

	Company	Cub Creek Energy		
	Well	Markham 9		
	Interval	Date From: 2016-09-23 12:54:28	Top: 1520.00	
	Created	Date To: 2016-09-25 01:10:35	Bottom: 11983.00	
		2016-09-26 04:03		

Gamma Ray - Apparent 3 ft Average GRAM 0 200	MD 1 : 1200 feet	Rate of Penetration 3 ft Average ROPA 1000 0	Surface Weight On Bit 1 ft Average WOBA 0 50
API		ft/h	klb
Azimuthal Gamma Ray - Apparent - Up Quadrant 3 ft Average GRAUM 0 200			Downhole Temperature TCDM 0 250
API			degF
Azimuthal Gamma Ray - Apparent - Down Quadrant 3 ft Average GRADM 0 200			
API			
True Vertical Depth TVD 7500 1500			







3100 3200 3300 3400 3500 3600 3700 3800 3900

